

**What is claimed is:**

1. A digital TV receiver, comprising:

an A/D converter for converting an analog signal into a digital signal;

a carrier recovery for converting the digital passband signal into a digital baseband signal; and

a symbol clock recovery for detecting timing error information by calculating digital-real/imaginary-passband-signals of the A/D converter or digital-real/imaginary-baseband-signals of a carrier recovery and squaring the added value, and for generating and outputting two times the frequency of the symbol clock corrected from the detected timing error information.

2. The digital TV receiver of claim 1, wherein the A/D converter converts the analog signal into a passband signal by sampling a fixed frequency generated by the fixed oscillator or by sampling the analog signal with two times the frequency of the symbol clock.

3. The digital TV receiver of claim 2, wherein the fixed frequency generated from the fixed oscillator is higher than the two times the frequency of the symbol clock.

4. The digital TV receiver of claim 1, wherein the carrier recovery multiplies a standard carrier signal by the digital passband signal through the carrier recovery and converts into the digital baseband signal.

5. The digital TV receiver of claim 1 further comprises a first resampler for resampling the digital real/imaginary baseband signals into the two times frequency of the symbol clock frequency and interpolating each of the signals.

6. The digital TV receiver of claim 5, wherein the symbol clock recovery comprises:

- an operator for calculating each of the digital baseband real/imaginary signals interpolated and outputted from the first resampler, and outputting the calculation;
- a squarer for squaring the output value of the operator;
- a pre-filter for passing only a frequency of a particular band to recover the symbol clock from the output of the squarer;
- a timing error detector for detecting timing error information from the output of the pre-filter;
- a filtering unit for filtering only the low passband signal from the timing error information outputted from the timing error detector; and

a NCO for generating two times the frequency of the symbol clock recovered according to low pass signals of the filtered timing error information and outputting to the first resampler.

7. The digital TV receiver of claim 6, wherein the operator squares each of the digital baseband real/imaginary signals interpolated and outputted from the first resampler, adds the two squared signals, and outputs the calculation; or calculate an absolute value for each of the digital baseband real number/imaginary signals interpolated and outputted from the first resampler, adds the absolute value of the two signals, and outputs the calculation.

8. The digital TV receiver of claim 5, wherein the symbol clock recovery comprising:

a second resampler for resampling the digital passband real/imaginary signals outputted from the A/D converter into the two times frequency of the symbol clock frequency and interpolating each of the signals;

a operator for calculating the digital passband real/imaginary signals outputted from the second resampler and outputting the calculation;

a squarer for squaring the output value of the operator;

a pre-filter for passing only a frequency of a particular band to recover the symbol clock from the output of the squarer;

a timing error detector for detecting timing error information from the output of the pre-filter;

a NCO for generating two times the frequency of the symbol clock recovered according to low pass signal component of the filtered timing error information and outputting to the first and the second resamplers.

9. The digital TV receiver of claim 8, wherein the operator squares each of the digital baseband real/imaginary component signals interpolated and outputted from the second resampler, adds the two squared signals, and outputs the calculation; or calculate an absolute value for each of the digital baseband real/imaginary component signals interpolated and outputted from the second resampler, adds the absolute value of the two signals, and outputs the calculation.

10. The digital TV receiver of claim 1, wherein the symbol clock recovery comprises:

an operator for calculating each of the digital baseband real/imaginary signals interpolated and outputted from the first resampler, and outputting the calculation;

a squarer for squaring the output value of the operator;

a pre-filter for passing only a frequency of a particular band to recover the symbol clock from the output of the squarer;

a timing error detector for detecting timing error information from the output of the pre-filter;

a filtering unit for filtering only the low passband signal from the timing error information outputted from the timing error detector; and

a variable oscillator for generating two times the frequency of the symbol clock recovered according to low pass signal component of the filtered timing error information and outputting to the A/D converter.

11. The digital TV receiver of claim 10, wherein the operator squares each of the digital baseband real/imaginary signals interpolated and outputted from the carrier recovery, adds the two squared signals, and outputs the calculation; or calculate an absolute value for each of the digital baseband real/imaginary component signals interpolated and outputted from the carrier recovery, adds the absolute value of the two signals, and outputs the calculation.

12. The digital TV receiver of claim 10, wherein the symbol clock recovery comprises:

a operator for calculating each of the digital baseband real/imaginary signals interpolated and outputted from the A/D converter, and outputting the calculation;

a squarer for squaring the output value of the operator;

a pre-filter for passing only a frequency of a particular band to recover the symbol clock from the output of the squarer;

a timing error detector for detecting timing error information from the output of the pre-filter;

a filtering unit for filtering only the low passband signal from the timing error information outputted from the timing error detector; and

a variable oscillator for generating two times the frequency of the symbol clock recovered according to low pass signals of the filtered timing error information and outputting to the A/D converter.

13. The digital TV receiver of claim 10, wherein the operator squares each of the digital baseband real/imaginary component signals interpolated and outputted from the A/D converter, adds the two squared signals, and outputs the calculation; or calculate an absolute value for each of the digital baseband real/imaginary component signals interpolated and outputted from the A/D converter, adds the absolute value of the two signals, and outputs the calculation.

14. A digital TV receiver, comprising:

an A/D converter for taking a sample of a fixed frequency from an analog passband signal and converting into a digital passband signal;

a carrier recovery for multiplying a standard carrier signal generated from the process of the carrier recovery of the digital passband signal and converting into the digital baseband signal;

a first resampler for taking a sample of two times the frequency of the symbol clock from the digital baseband real/imaginary signals generated from the carrier recovery and interpolating.

A symbol clock recovery for detecting timing error information from the digital passband signal or the digital baseband signal and generating and outputting the two times frequency of the symbol clock frequency corrected from the detected timing error information.

15. The digital TV receiver of claim 14, wherein the symbol clock recovery comprises:

a operator for calculating the digital baseband real/imaginary signals interpolated and outputted from the first resampler;

a squarer for squaring the output value of the operator;

a pre-filter for passing only a frequency of a particular band to recover the symbol clock from the output of the squarer;

a timing error detector for detecting timing error information from the output of the pre-filter;

a filtering unit for filtering only the low passband signals from the timing error information outputted from the timing error detector; and

a NCO for generating two times the frequency of the symbol clock recovered according to low pass signals of the filtered timing error information and outputting to the first resampler.

16. The digital TV receiver of claim 15, wherein the operator squares each of the digital baseband real/imaginary signals interpolated and outputted from the first resampler, adds the two squared signals, and outputs the calculation; or calculate an absolute value for each of the digital baseband real/imaginary signals interpolated and outputted from the first resampler, adds the absolute value of the two signals, and outputs the calculation.

17. The digital TV receiver of claim 14, wherein the symbol clock recovery comprising:

a second resampler for resampling the digital passband real/imaginary signals outputted from the A/D converter into the two times frequency of the symbol clock frequency and interpolating each of the signals;



a operator for calculating the digital passband real/imaginary signals outputted from the second resampler and outputting the calculation;

a squarer for squaring the output value of the operator;

a pre-filter for passing only a frequency of a particular band to recover the symbol clock from the output of the squarer;

a timing error detector for detecting timing error information from the output of the pre-filter;

a NCO for generating two times the frequency of the symbol clock recovered according to low pass signal component of the filtered timing error information and outputting to the first resampler and the second resampler.

18. The digital TV receiver of claim 17, wherein the operator squares each of the digital baseband real/imaginary signals interpolated and outputted from the second resampler, adds the two squared signals, and outputs the calculation; or calculate an absolute value for each of the digital baseband real/imaginary signals interpolated and outputted from the second resampler, adds the absolute value of the two signals, and outputs the calculation.

19. A digital TV receiver, comprising:

an A/D converter for taking a sample of a fixed frequency from an analog passband signal and converting into a digital passband signal;

a carrier recovery for multiplying a standard carrier signal generated from the process of the carrier recovery of the digital passband signal and converting into the digital baseband signal; and

a symbol clock recovery for detecting timing error information from the digital passband signal or the digital baseband signal and generating and outputting the two times frequency of the symbol clock frequency corrected from the detected timing error information.

20. The digital TV receiver of claim 19, wherein the symbol clock recovery comprises:

a operator for calculating each of the digital baseband real/imaginary signals outputted from the carrier recovery, and outputting the calculation;

a squarer for squaring the output value of the operator;

a pre-filter for passing only a frequency of a particular band to recover the symbol clock from the output of the squarer;

a timing error detector for detecting timing error information from the output of the pre-filter;

a filtering unit for filtering only the low passband signal from the timing error information outputted from the timing error detector; and

a variable oscillator for generating two times the frequency of the symbol clock recovered according to low pass signal component of the filtered timing error information and outputting to the A/D converter.

21. The digital TV receiver of claim 20, wherein the operator squares each of the digital baseband real/imaginary signals interpolated and outputted from the carrier recovery, adds the two squared signals, and outputs the calculation; or calculate an absolute value for each of the digital baseband real/imaginary signals interpolated and outputted from the carrier recovery, adds the absolute value of the two signals, and outputs the calculation.

22. The digital TV receiver of claim 19, wherein the symbol clock recovery comprises:

a operator for calculating each of the digital baseband real/imaginary signals interpolated and outputted from the first resampler, and outputting the calculation;

a squarer for squaring the output value of the operator;

a pre-filter for passing only a frequency of a particular band to recover the symbol clock from the output of the squarer;

a timing error detector for detecting timing error information from the output of the pre-filter;

a filtering unit for filtering only the low passband signal from the timing error information outputted from the timing error detector; and

a variable oscillator for generating two times the frequency of the symbol clock recovered according to low pass signal component of the filtered timing error information, and outputting to the A/D converter.

23. The digital TV receiver of claim 22, wherein the operator squares each of the digital baseband real/imaginary signals outputted from the A/D converter, adds the two squared signals, and outputs the calculation; or calculate an absolute value for each of the digital baseband real/imaginary signals outputted from the A/D converter, adds the absolute value of the two signals, and outputs the calculation.